

Mesh evaluation

The estimation of the spacing for the mesh along the y direction is performed through one of the utilities that can be found inside the folder `utilities/Stretching Mesh`. For a channel flow case, the default function of Incompact3d can be used, `stretching_parameter_channel.f90`.

For a temporal TBL case instead, a new function was developed, starting from the stretching subroutine that can be found inside the original solver of Incompact3d. This new function is a Python script, `mesh_evaluation.py`. This function allows to estimate the mesh size by introducing the following inputs:

- Domain dimension L_y .
- Number of points n_y .
- Stretching parameter β .
- Skin friction coefficient c_f .
- Kinematic viscosity ν .
- Velocity of the wall U_w .

And it produces the following outputs:

- Mesh size at the first element near the wall Δy_1^+ .
- Mesh size at the last element away from the wall Δy_n^+ .
- Number of mesh nodes in the viscous sublayer.

For the temporal BL case, the shear velocity is calculated as following:

$$u_\tau = U_w \sqrt{\frac{c_f}{2}}$$

since c_f is our input.